TAB C: VALVE AND PIPING GUIDANCE

Preface.

This guidance was derived from 40 CFR 112 of 17 July 2002, and tailored to assist Navy and Marine Corps installations in the interpretation and implementation of SPCC requirements, and in the preparation of installation SPCC Plans. Reference citations from the regulation are included where appropriate, and can be easily distinguished from guidance text by *italic* font located between brackets (e.g., [*§ 112.7(b)*].)

The following section includes guidance on implementation of SPCC Plan requirements pertaining specifically to valves, piping, and appurtenances though which oil is transferred oil to or from bulk storage containers.

An SPCC Plan must be certified by a PE, whose endorsement indicates the Plan not only meets regulatory requirements, but is also adequate for the facility and has been prepared in accordance with applicable industry standards. Therefore, when following the recommendations contained in this document, it should be understood that that the minimum requirements described herein may not be adequate for each facility. Rather, good engineering judgment must be exercised by the certifying PE.

Refer to Section 2 of this document for the sequential section-by-section discussion of the regulation in the order of Part 112.

Valve and Piping Guidance for SPCC Requirements.

C.1 Applicability.

Navy and Marine Corps installations that meet either of the following criteria are subject to 40 CFR 112 (providing the installation stores, transfers, distributes, or consumes oil and oil products that could reasonably be expected to reach navigable waters if spilled or released) and must prepare an SPCC Plan [*§ 112.1*]:

- The installation's underground oil storage capacity exceeds 42,000 gal (excluding completely buried storage tanks subject to all of the technical requirements of 40 CFR 280).
- The installation's aggregate aboveground oil storage capacity (including all tanks, containers, and operating equipment 55 gal or greater in capacity) exceeds 1,320 gal.

At an installation where either of the above scenarios apply, bulk storage containers used to store oil must be included in an installation SPCC Plan if they are 55 gal or greater. The valves and piping through which the oil is transferred to or from these containers must also be including in the SPCC Plan, as they pose a similar potential threat of discharge to the environment.

C.2 Facility Diagram and Site-Specific Drawings.

A facility diagram or set of diagrams must include all connecting piping [*§ 112.7(a)(3)*]. Site-specific drawings are not explicitly required in Part 112; in fact, for many small owner/operators, a facility diagram may be just as detailed as any site-specific drawing, and therefore be completely adequate. However, most Navy and Marine Corps installations are quite sizeable, thus the scale of a facility diagram (or even a set of facility diagrams) may preclude the possibility of depicting details of individual valves, piping, or

appurtenances throughout the installation. Consequently, it may be desirable to include site-specific drawings in subsequent sections of the Plan (i.e., in addenda, attachments, appendices, 'write-ups', etc.) to better illustrate these details. A sample site-specific drawing has been included in Section 3 Tab A as Figure A-1.

C.3 Fault Analysis.

The direction, rate of flow, and total quantity of oil that could be discharged from the facility as a result of each type of major equipment failure must be predicted where experience indicates a reasonable potential for equipment failure. Major equipment failure may include loading/unloading equipment, or tank overflow, rupture, or leakage [*§ 112.7(b)*]. Specific piping examples of major equipment failure may include overfill via piping or valve or piping failure resulting in leakage.

If site-specific drawings are included in the SPCC Plan, illustrate the predicted discharge directions in the drawings (see Section 3 Tab A, Figure A-1). It will still be necessary to discuss the rate of flow from piping-related failure and total quantity of oil that could be discharged as a result of the piping-related failure. If site-specific sections are not included in the SPCC Plan, discuss the discharge direction, rate of flow, and total quantity predictions throughout the installation (e.g., include tables or matrices listing these attributes of each site).

C.4 Secondary Containment.

Piping connected to bulk storage containers that are 55 gal or greater and can reasonably be expected to discharge oil to navigable waters must have some form of containment and/or diversionary structures that would prevent a piping discharge from reaching the navigable waters. At minimum, one of the following discharge prevention systems must be used [*§ 112.7(c)*]:

- Dikes, berms, or retaining walls sufficiently impervious to contain oil.
- Curbing.
- Culverting, gutters, or other drainage systems.
- Weirs, booms, or other barriers.
- Spill diversion ponds.
- Retention ponds.
- Sorbent materials.

In practice, the certifying PE must be comfortable with the adequacy of the discharge prevention system (or system the PE recommends in the Plan) to capture a piping discharge, and prevent it from reaching navigable waters before cleanup can commence.

Although not specifically identified as secondary containment systems in § 112.7(c), buildings may themselves be adequate diversionary structures, exhibiting the containment characteristics of dikes, retaining walls, or other barriers. However, the floors and walls of the structure would have to be sufficiently impervious to contain oil (e.g., free of floor drains, cracks, and porous joints or gaps).

In rare cases, installation of secondary containment structures or pieces of equipment may be determined to be not practicable. In such instances, a clear explanation of why such measures are not practicable must be provided in the SPCC Plan. The reason for nonconformance must be justified, and alternate methods of 'equivalent environmental protection' must be provided [*§ 112.7(d)*]. Note that costs or economic impacts are excluded justifications as to why an installation cannot satisfy the general secondary containment requirement. Justifiable reasons why secondary containment may be considered not practicable include:

- Space or other geographic limitations of the facility.
- Local zoning ordinances, fire prevention standards, or safety considerations.
- Installation would defeat the overall goal of 40 CFR 112 to prevent discharges.

If site-specific sections are included in the SPCC Plan, secondary containment and/or diversionary structures could be depicted in those drawings (see Section 3 Tab A, Figure A-1) and/or illustrated in photographs. However, this approach is not mandatory; the requirement is only for secondary containment to be adequately described in the Plan (whether in text, diagrams, photographs, or a combination of these). If site-specific sections are not included in the SPCC Plan, discuss how secondary containment is provided throughout the installation (e.g., include a table or matrix listing the secondary containment attributes for each site).

Cost Information

The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to construction or equipment purchase.

Information on numerous approaches to secondary containment and related items is included in Section 4 Appendix A. Relevant approaches and items discussed include:

- Portable containment berms: $200 - $1,400 for smaller berms, $3,000 - $7,000 for larger berms (per vendors).
- Spill kits: $100 - $1,000 per spill kit (per vendors).
- Drain covers: $100 - $500 per cover (per vendors).
- Concrete berm design: $3,130 - $10,239 for tank capacities of 500 - 5,000 gal (per PWD).
- Masonry berm design: $1,547 - $2,686 for tank capacities of 250 - 1,000 gal (per PWD).
- Rollover (drivable) berm design for loading/unloading areas: $3,775 - $11,713 for tank capacities of 1,000 - 5,000 gal (per PWD).
- Earth berm design: $857 - $1,322 for tank capacities of 250 - 1,000 gal (per PWD).
- Repair or sealing of cracks and fissures: $30 - $35 per linear foot (per PWD).
- Doorway spill barriers: $2,985 - $10,909 for manual or automatic barriers from 3’ - 10’ wide (per vendors).
- Oil-swellable absorbent polymer storm drain inserts: $800 - $10,000 for drain protection shut-off systems or $81 - $227 for Imbiber Bead packets, pillows, blankets, boom, etc. (per vendors).

C.5 Deviation from Secondary Containment Requirement (Contingency Planning).

Where it is not feasible to install secondary containment, valves and piping associated with bulk storage containers must undergo periodic integrity and leak testing. An explanation of why secondary containment is not practicable must be provided, and unless the installation maintains a Facility Response Plan (FRP), a contingency plan and a written commitment of manpower, equipment, and materials dedicated to oil spill response must also be provided [*§ 112.7(d)*].

Not to be confused with routine visual inspections, integrity testing consists of any means to measure the strength (i.e., structural soundness) of the valves and piping. Integrity testing includes both the inside and outside of the piping, as well as the foundation and supports. Leak testing is testing to determine the liquid tightness of valves and piping, and whether they may discharge oil.

The following types of testing can be employed to determine the integrity and liquid tightness of associated valves and piping [*§ 112.8(c)(6)*]:

- Hydrostatic Tests.
- Radiographic Tests.
- Ultrasonic Tests.
- Acoustic Emissions Tests.
- Measured settlement during Hydrostatic Tests.
- Pressure Tests (Hydrostatic or Pneumatic Leak Tests).
- Other Non-Destructive Tests.

Note that there may be defensible reasons (e.g., costs or economic impacts) why an installation cannot satisfy the integrity and leak testing requirement for piping. In such instances, a clear explanation of why such measures are not practicable must be provided in the Plan. The reason for nonconformance must be justified, and alternate methods of 'equivalent environmental protection' must be provided [*§ 112.7(d)*].

The EPA chose not to define a required frequency for integrity and leak testing valves and piping, instead opting to require 'periodic' testing be performed in accordance with industry standards. Earlier, the EPA had proposed the following frequency be followed:

- Integrity test and leak test associated valves and piping without secondary containment annually.

[These testing intervals have been included here only to provide a frame of reference; no intervals are defined or implied in § 112.7(d) or § 112.8(c)(6).] The schedule the PE selects should be based on industry standards, and must be clearly documented in the SPCC Plan. Refer to the following industry standards for further guidance on testing methods and appropriate frequencies: API 570, "Piping Inspection Code – Inspection, Repair, Alteration, and Rerating of In-service Piping Systems"; Section 3 of API Recommended Practice 1110, "Pressure Testing of Liquid Petroleum Pipelines"; and Chapter 4 of ASME B31.3, "Process Piping".

Cost Information

The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to testing on a case-by-case basis.

As noted above, bulk storage containers deviating from secondary containment requirements must have periodic integrity testing, and associated valves and piping must have periodic integrity testing and leak testing. Information on integrity testing is included in Section 4 Appendix A. Relevant items discussed include:

- Leak testing of valves and piping: $200 - $1,000 per pipe segment, $40,000 - $1M for installation of permanent release detection systems for large underground piping systems (per Navy Environmental Requirements Guidebook), $465 per tank for buried piping (per EPA).

C.6 Security.

Valve and piping security is achieved with secure valve locking, pump starter control locking, and piping connection capping [*§ 112.7(g)*]. Refer to Tab E, Security Guidance, for further discussion.

C.7 New Buried Piping.

New underground piping (installed after August 16, 2002) must have protective wrapping and coating, and be protected from corrosion [*§ 112.8(d)(1)*].

Cathodic protection must be provided for buried metallic piping installed on or after 16 August 2002, as well as for other buried metallic piping installed after 1973 (when the initial SPCC regulations were promulgated) if soil conditions warrant. Note that the EPA believes all soil conditions warrant protection of buried piping; a deviation which seeks to avoid coating or cathodic protection, or some alternate means of buried piping protection, on the grounds that the soil is somehow incompatible with such measures, will not be acceptable to the EPA.

If site-specific sections are included in the SPCC Plan, depict the underground piping in the drawings (see Section Tab A, Figure A-1). It will still be necessary to describe the coating and corrosion protection in the site-specific section. If site-specific sections are not included in the SPCC Plan, discuss any new underground piping throughout the installation (e.g., include tables or matrices listing the coating and

corrosion protection attributes of each site), and ensure the new underground piping, and all other piping, is depicted on the facility diagram or set of facility diagrams.

Refer to the following industry standards for further guidance on corrosion protection for buried piping: NACE Recommended Practice 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems" and STI Recommended Practice 892, "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems".

Cost Information
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to construction or equipment purchase.

Information on the protection of buried piping is included in Section 4 Appendix A. Measures discussed include:

- Buried piping upgrade or replacement: $200 per foot for removal and replacement of substandard piping 10 feet or less in length, or $150 per foot for piping in excess of 20 feet in length, plus another 10% - 20% in design costs (per Navy Environmental Requirements Guidebook).
- Cathodic protection of buried pipelines: $1,500 - $2,500 per year per pipeline for impressed current systems, or $300 - $800 per year per pipeline for magnesium anode systems (per Navy Environmental Requirements Guidebook).
- Pipe wrapping or coating: $20 - $75 for 30 yards of pipe tape 1" to 4" in width (per vendors); $300 for primer coating, and $1,340 for pipe tape to coat and wrap 200 feet of 6" pipe (per NFESC).

C.8 Pipe Supports.

Pipe supports must be designed to minimize abrasion and allow for contraction and expansion [*§ 112.8(d)(3)*]. For example, piping may be bracketed to walls or structures rather than rigidly attached; have expansion loops or bellows; or be wrapped at joints or fastenings, to minimize abrasion.

Refer to the following industry standards for further guidance on minimizing abrasion and allowing for contraction and expansion: Chapter 2 of ASME 31.3, "Process Piping", and Section 8 of API Standard 2610, "Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities".

Cost Information
The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to construction or equipment purchase.

Information on the protection of buried piping is included in Section 4 Appendix A. Measures discussed include:

- Pipe hangers and supports: up to $100 for clevis hangers, rolls, split rings, straps, or U-bolts, or up to $228 for saddles, for 1" - 12" pipe (per RS Means).

C.9 Inspection and Testing of Valves and Piping.

Aboveground pipes, valves, and appurtenances must be regularly inspected [*§ 112.8(d)(4)*]. Inspections must assess the general condition of items such as:

- Flange joints.
- Expansion joints.
- Valve glands and bodies.

- Catch pans.
- Pipeline supports.
- Locking of valves.
- Metal surfaces.

Integrity and leak testing of underground piping must also be performed when installed, modified, or replaced [*§ 112.7(d)*]. Refer to Section C.5 above for further discussion of the general requirement for integrity and leak testing valves and piping.

Refer to the following industry standards for further guidance on inspection and testing of valves, piping, and appurtenances: API 570, "Piping Inspection Code – Inspection, Repair, Alteration, and Rerating of In-service Piping Systems"; API Recommended Practice 574, "Inspection Practices for Piping System Components"; Section 3 of API Recommended Practice 1110, "Pressure Testing of Liquid Petroleum Pipelines"; and Chapter 4 of ASME B31.3, "Process Piping".

C.10 Vehicular Traffic.

Vehicles entering the facility must be warned not to endanger aboveground piping [*§ 112.8(d)(5)*]. Vehicular warnings may include verbal warnings, signs, markings, or temporary protection of piping and equipment.

Cost Information

The following cost information has been provided to assist in compliance planning. The cost information should be considered rough approximations that could vary by size, scope, economy of scale, location, mobilization, region, etc. Actual costs should be verified prior to construction or equipment purchase.

Information on approaches to warning vehicles of aboveground piping and other oil transfer operations is included in Section 4 Appendix A. Measures discussed include:

- Signs and placards: up to $150 per sign (per PWD).
- Traffic bollards: $500 per steel concrete-filled bollard (per PWD).